Partners Project Title Page
Proposals for a Partners Project

Title: A Preliminary Investigation to Begin Defining the Role of the Marine Boundary Layer with Regard to Cold Season Tornadogenesis along the north central Gulf Coast

Date: March 15, 2019

Signatures for University
University Name: University of South Alabama
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University of South Alabama
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John Lanicci

Principal Investigator
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Greg Patrick

STSD Chief
Name (typed): Greg Patrick

Steven Cooper

Regional Director
Name (typed): Steven Cooper

SUMMARY OF BUDGET REQUEST:

COMET FUNDS: Year 1 $15,000
NWS FUNDS: FY $2350 **FY 2** $3650
STI Portfolio - Total $6K

COMET Partners Proposal
"Defining the Role of the Marine Boundary Layer in Cold Season Tornadogenesis along the north central Gulf Coast"

University Partners: Dr. John Lanicci, Dr. Sytske Kimball, and Dr. Wesley Terwey, University of South Alabama, Department of Earth Sciences

National Weather Service Partners: Jonathan Howell and Jeffrey Medlin, National Weather Service, Mobile, AL

1. Introduction

The northern Gulf Coast is particularly susceptible to severe weather and tornado occurrence during the cold season. In fact, it was found that two-thirds (68%) of all winter tornadoes (defined as occurring between December and February) occur along the Gulf Coast or Southeastern United States (Galway and Pearson, 1981). Much closer to the proposed study area, data show between 1950-2016, approximately 32.9% of all tornadoes that occured, did so between November and February within a region centered along the north Central Gulf Coast [from -91.5 deg W to 85.0 deg E and as far inland as 31.5 deg N]. This study area was carefully chosen to be south of the Dixie Tornado Alley defined by Gagan et al. (2010) so as to focus closer to the coast, but yet still capture the overall nature of tornado frequency of the region. Based on these data, one could expect on average approximately 9.4 events per cold season (i.e., November through February) having at least one tornado occur in each event. Tornado data were gathered from the Storm Prediction Center's database [Available online at: https://www.spc.noaa.gov/climo/online/]. Numerous studies have identified the important role vertical wind shear and thermodynamic instability play in severe thunderstorm and tornado development (Craven, 2000; Rasmussen and Blanchard, 1998; Rasmussen, 2003; Thompson et. al., 2012, Medlin and Bunkers, 2008). During cold season tornado events, the amount of vertical wind shear and thermodynamic instability available to aid tornado occurrence is even more critical. Guyer et. al. (2006) found cold season Gulf Coast significant tornado events (F2+) were characterized by very strong vertical wind shear, especially below 850 mb, and concentrated high values of low-level instability, as measured between the surface and 3 km. Similar findings regarding strong low level shear and tornado occurrence during the cold season are also supported by a local study performed by Medlin and Bunkers (2008), which reconstructed hodographs within 120 km (60 mi) of Mobile, Alabama. These findings reinforce the importance of thoroughly understanding ambient environmental conditions prior to the formation of cold season parent tornado-producing mesocyclones, and particularly, developing a better understanding of processes in the lowest 1 km, where an approximate 66% of the total 0-3 km vertical wind shear was distributed on average for the cases examined.

Cold season severe thunderstorm environments along the northern Gulf Coast are influenced by both moisture and thermal advection from the nearby Gulf of Mexico, as these ultimately determine the vertical profiles of temperature and moisture, and hence, the amount of thermodynamic instability available for developing thunderstorm updrafts. Low level instability, which has been identified as an important factor in cool season Gulf Coast tornadoes, is modulated by the extent of inland advection of the marine boundary layer (MBL). There remains uncertainty with respect to exactly how the MBL impacts low level instability and tornado production. Evans and Guyer (2006) investigated the relationship between the marine environment over the western Gulf of Mexico and cool season significant (F2 or greater) tornado events. Their findings suggest significant cool season tornado events were commonly preceded by air mass recovery at offshore buoys between 48 and 72 hours prior to the event. They also stated if this recovery were to not occur, uncertainty in event occurrence increased. Limited research has been conducted to sample the quality and depth of the MBL thermodynamic characteristics preceding tornado events along the north central Gulf Coast. There remains a lack of upper air observations to directly measure the characteristics of the MBL in the vicinity of potential developing tornadic updrafts along the north central Gulf Coast during the cold season. The closest upper air sampling occurs at 12z and 00z each day at Slidell, Louisiana, and Tallahassee, Florida, which are 156 km (97 mi) and 378 km (235 mi) away, respectively, from the largest population center of Mobile, Alabama. Potvin et. al. (2010) found a representative sounding should be within 80 km (50 mi) and 2 hours of a tornadic event. The existing NWS sounding locations are both spatially and temporally inadequate to meaningfully sample the local atmosphere across the NWS Mobile-Pensacola CWA. This forces forecasters to rely on model soundings which may not accurately represent the near-storm developing mesocyclone environment.

NWS Mobile will collaborate with the University of South Alabama (USA) (hereby research team) to investigate the MBL and its impact on local cold season tornadogenesis. For the purposes of this study, the cold season has been defined as November through February. The research team will focus efforts on better quantifying how SSTs and diurnal heating impacts return flow air mass stability and concurrent cold season tornadogenesis.

2. Statement of Objectives

Understanding the stability of the MBL during the cold season is key to accurately predicting environments favorable for parent mesocyclone tornadogenesis. The overall synoptic pattern transitions during the fall season from primarily barotropic to baroclinic along the north central Gulf Coast. Successively stronger cold fronts transport colder continental - polar - and arctic origin air masses southward across both land and marine areas by late fall and winter. These fronts eventually have the effect of cooling the water temperatures of area rivers and the shallow shelf waters of the northern Gulf of Mexico. Cold river water drains into local bays and into the nearshore coastal areas, helping to further cool shelf waters. The degree of cooling that occurs within the shelf waters typically intensifies during the winter months. During the fall and spring seasons, sea surface temperatures are still relatively mild and likely do not modify air masses enough to reduce instability available for development of deep, severe convection. Later in the winter season, however, air masses that advect over the increasingly colder shelf waters of the northern Gulf of Mexico are believed to be more strongly modified and become increasingly stable in the lowest levels of the atmosphere, with a pronounced low level marine inversion present. The degree of modification is most likely dictated by the magnitude of cold SSTs present within the shelf waters and residence time of the air mass over colder SSTs when developing synoptic return flows advect the modified air mass back towards the coast. Air masses that move across anomalously colder SSTs, or that spend a longer period of time over colder SSTs, likely exhibit a shallow but significant stable layer in the lowest portion of the atmosphere. Any convection that develops in this type of environment will remain elevated as unstable conditions will only support convection based above the near surface stable layer. A recent study by Kis and Stratka (2010) suggests that nocturnal tornadoes may occur within an environment characterized by a shallow near-surface stable layer. Yet their findings were based upon proximity soundings created using the RUC-2 model data and did not directly measure the near-storm environment. Direct observational sampling of the environment should provide a better approximation for the impact of a near surface stable layer on tornado occurrence.

Another factor to consider is how air masses are again modified once returning across land. Sufficient diabatic heating over land can erode any existing shallow marine inversion associated with the MBL and change the low level stability profile. There remains great uncertainty regarding how far inland the stable MBL penetrates and the rate at which stability within the MBL is modified over inland locations. Medlin and Croft (1998) found that the marine layer can penetrate much farther inland when the adjacent land heats to a much warmer temperature than the sea-surface. Such a scenario would more likely occur during the early to mid-Spring as the land heats to near 25 deg (C), while the adjacent nearshore waters are still relatively cool (closer to 15 deg (C)). However, during the heart of the cold season, this contrast does not exist to the same extent between land and water, thus, the dependency on sea-surface temperature anomalies and the exact characteristics of the return flow ultimately determine the magnitude and inland penetration of the MBL. Deep convective initiation, and ultimately tornadogenesis, are impacted by the thermal gradient between nearshore waters and adjacent land areas (i.e., relatively cool water with warmer adjacent land, relatively warmer waters with cooler adjacent land, or where very little thermal gradient exists between land and water).

In order for operational forecasters to correctly diagnose the potential for severe surface-based convection capable of tornadogenesis during the cold season, they must have an accurate understanding of SST anomalies, air mass residence times, any inland air mass modifications, and how these factors impact stability within the MBL. This research study will pursue these objectives and provide NWS operational forecasters with new tools for assessing tornado potential in the cold season and lead to improving local tornado warning operations.

A. Review of SST Anomalies and Their Influence on Environmental Conditions and Tornadogenesis.

The research team will begin by computing mean SSTs by month during the pre-defined cold season (November-February) to better understand the influence of Gulf of Mexico shelf water SSTs on the stability within the MBL. The SST data will be collected from the NASA Short-term Prediction Research and Transition Center (SPoRT) data from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument aboard the Terra and Aqua satellites. These monthly mean SSTs will serve as a baseline to compare against daily maximum

SSTs observed within the shelf waters on both historical tornado event days and null event days. Historical tornado event days are defined as 24 hour periods on the same calendar day, when tornadoes actually occurred within our defined study area and were documented in NWS Storm Data. Conversely, historical null event days are defined as 24 hour periods on the same calendar day, when a favorable synoptic environment existed, and tornadoes were anticipated and warned for across our defined study area, but did not actually occur. The area of study is defined as locations within 50 km on either side of line from (1) Buoy Station 42040 - Luke Offshore Test Platform (63 NM south of Dauphin Island), to (2) Dauphin Island, AL, to (3) the USA Campus located in West Mobile, AL, to (4) the South Alabama Mesonet site located in Mt. Vernon, AL. The objective for these comparisons will be to identify how SST anomalies may have affected air mass modification, if any. Air mass modifications, in turn, would impact the stability of the local environment and tornado potential.

B. Identifying Initial Air Mass Characteristics and Residence Times during Return Flow Events

Air mass modification is impacted by the initial characteristics of the continental air mass that advects over the northern Gulf of Mexico during the cold season, along with the residence time of that air mass over an anomalously cold, anomalously warm, or seasonally temperate sea surface within the nearshore shelf waters. Air mass modifications ultimately determine the stability characteristics and quality of the air mass returning inland. Therefore it is important that characteristics of continental air masses are sampled to determine initial low level stability prior to any possible air mass modifications. It will also be critical to determine residence time of return flow air masses over nearshore shelf waters, especially those times when shelf waters are anomalously cold. It is currently assumed that long residence times over anomalously cold shelf waters will have the greatest impact on inhibiting air mass destabilization and subsequent inability to support tornadogenesis inland. This assumption will be tested through measurements of air mass stability characteristics both prior to air moving from land areas to marine areas, as well as return flow residence times over nearshore shelf waters with differing thermal profiles.

A close analysis of surface observations will be used to determine air mass characteristics and residence times. These observations will be collected at both land and marine based locations to include: (1) Buoy 42040, (2) C-MAN station DPIA1 - Dauphin Island, AL, (3) ASOS station KMOB located at the Mobile Regional Airport, and (4) the South Alabama Mesonet station at Mt. Vernon, AL. A sophisticated spreadsheet algorithm utilizing surface mean sea level pressure, wind direction, dewpoint and temperature trends will be employed to identify air mass changes and to calculate residence times. We will also utilize the surface observations to describe characteristics of the air masses (i.e., thermal, moisture, wind, and pressure tendencies) and interpret air mass stability.

C. Sampling the Atmosphere to Identify Characteristics of the MBL and Impacts to Tornadogenesis

Direct sampling of ambient low level thermodynamic and instability conditions within the inland advecting MBL will prove beneficial in assessing the potential to support the initiation of parent tornado-producing mesocyclones. Radiosondes (see Section 3. Equipment Selection and Funding) will support this endeavor. The University of South Alabama (USA) will form a team of students and faculty that will launch weather balloons and create soundings during the cold season in advance of anticipated tornado occurrence. The weather balloons will be launched from land-based locations within the area of study and launched during identified intensive operational periods (IOP). IOPs will be determined 48 hours in advance by NWS operational forecasters, when forecast environmental conditions appear favorable for tornadoes during the period from November 1, 2019, through February 28, 2020. The balloon launch sites within the area of study were chosen for their position within the corridor of low level return flow. The land-based launch sites include; (1) Dauphin Island, AL, (2) the USA Campus in West Mobile, AL, and (3) the South Alabama Mesonet site located in Mt. Vernon, AL. For the single offshore site, located at Buoy Station 42040, high resolution rapid refresh (HRRR) model soundings will be modified using marine observation data. The balloon launches will occur within two hours of anticipated severe thunderstorm occurrence to satisfy the suitable representative sounding criteria identified by Potvin et al. (2010). Balloon launches will also be limited to daytime operations to comply with safety requirements of the USA balloon launch teams.

The sounding data collected will be analyzed to determine low-level lapse rates, moisture, temperature, depth of the MBL, presence of a marine layer inversion, and mean temperature of the surface compared to mean inversion top temperature. From these data, the research team will determine if there are statistically significant differences in stability between MBL air masses that support tornado occurrence and those MBL air masses that do not, and how air mass modification impacted each low level environment. The data will also help the research team determine the vertical distribution (ie. skinny, fat, packed down low, etc.) of convective available potential energy (CAPE) and how it impacts tornadogenesis.

3. Equipment Selection and Funding

A “Windsond” PBL balloon sounding system will be purchased from Sparv Embedded AB. The ground station with case costs \$4,185. We will require 20 reusable radiosondes. At \$166.25 each, this comes to \$3,325. In total an amount of \$7,510 is budgeted for materials and supplies.

Bessardon et. al. (2018) conducted a field observation in 2016 which compared the first generation Windsonde S1H2 radiosonde to the operationally accepted Vaisala RS41-SG. Their results suggest a good correlation in data quality between the two systems, especially in the boundary layer. There were slight degradations noted with the Windsonde S1H2 with respect to the GPS signal processing and humidity response time at cloudtop, where the Vaisala performed slightly better. Wilzen (2019) in personal communication noted Sparve Embedded AB has reduced wind jitter, improved altitude calculation, and improved the temperature/relative humidity correction. Markowski et. al. (2018) also successfully utilized Sparve Embedded AB swarmsondes while participating with the National Severe Storms Laboratory (NSSL) field study entitled Rivers of Vorticity in Supercells (RiVorS) project late in May 2017. Overall, the radiosondes from Sparve Embedded AB proved reliable as compared to other operationally accepted radiosonde equipment currently being used for research today.

An added benefit of the Windsonde S1H3 radiosonde that will be used in this field study is the ability to retrieve the radiosonde and reuse for additional launches. Bessardon et. al. (2018) identified through reproducibility tests that there is no major performance degradation arising from radiosonde reuse. Sparve Embedded AB states that "recovery rates of 90 percent can be expected" (Sonde Reuse). A specifically developed algorithm allows users to choose a landing site with about 50 meters accuracy. The sonde can be cut from the balloon by the user at a specified altitude. Then the ground station updates the predicted landing location as the sonde returns to the ground. This should allow for most of the radiosondes to be recovered and reused for additional launches (Windsonde) which in turn should provide the necessary equipment to conduct the required field study necessary for this research.

Lightweight and reusable radiosonde

Windsond is a weather balloon system for an immediate view of local conditions at different altitudes. The focus on portability and low operating costs makes it perfect for frequent use in the field.

- Uniquely small size (30 liter helium)
- Save precious helium and canister size
- Real-time wind, temperature, humidity profiles
- Predict and control landing location
- Reusable sondes for best economy
- Reliable sonde recovery even days later
- User-friendly ground station software
- Outputs over 10 data formats, including WRF and CSV

Specifications S1H3	
Operating range	-40 ~ +80° C 0 ~100% RH
Temperature sensor	Type: Band gap Accuracy: 0.3 °C Resolution: 0.01 °C
Humidity sensors	Type: Capacitive Accuracy: 2.0 %RH Resolution: 0.05 %RH
Air pressure	Range: 300 – 1100 hPa Resolution: 0.02 hPa Accuracy: 1.0 hPa (at 700 – 1100 hPa)
Wind direction	Resolution: 0.1°
Wind speed	Range: 0 – 150 m/s
Sonde weight	12 gram
Max altitude	9000 m MSL

For full specification see Windsond® product catalog

Source: Windsond (http://windsond.com/)

4. Tasks and Timeline

The operational portion of the project involves the participation of NWS personnel working directly with faculty and students from USA.

The following specific tasks will be undertaken by NWS Mobile:

- NWS personnel will identify and coordinate 24 hours in advance when radiosonde/balloon equipment should be launched based upon the latest weather forecast, observations, and severe weather - tornado potential.

- NWS personnel will analyze collected sounding data and provide updated severe weather forecasts.
- NWS personnel will alter severe convective warning operations based upon the latest analysis of the pre-storm and near-storm environment.
- NWS personnel will coordinate with USA to input collected sounding data into the NWS operational forecast environment in near real time via AWIPS.
- NWS personnel will archive sounding data for research/NWS training purposes.
- NWS personnel will utilize archived sounding data to investigate pre-storm and near-storm environments that lead to tornadic vs. non-tornadic thunderstorms.

The following specific tasks will be undertaken by USA faculty and students:

- Purchase supporting equipment for Portable Upper-Air Sounding System.
- Organize operational teams consisting of the university principal investigator and students that will transport the mobile upper air equipment to the coordinated NWS/USA launch locations.
- Coordinate and assist NWS personnel with local scientific research.
- Utilize collected meteorological data to conduct research and produce a peer reviewed publication in a national meteorological journal and conduct a presentation at NWA or AMS.
-Supplement traditional course materials with hands-on learning opportunities involving the Mobile Upper Air Sounding Systems.
-Supplement traditional course materials with COMET modules on upper-air data, boundary-layer dynamics, and severe convective environments.
-Publicize the NOAA-university partnership for the benefit of students and citizens.

A. Approximate Task Timeline:

Time	Task	Assignment
Apr. 2019 - Jan. 2020	Compile Historical SPoRT Satellite Data and Historical Tornado Data from NWS Storm Data to Identify Gulf of Mexico SST Anomalies & Research Impacts of these SST Anomalies on Gulf Coastal Plain Stability and Tornadogenesis	NWS & USA
Jun. 2019 - Oct. 2019	Develop Deployment Protocol	NWS & USA
Nov. 2019 - Feb. 2020	Deployments & Data Collection	USA
After Nov. 2019	Utilize Data to Improve Severe Weather Forecast & Warning Operations	NWS
Nov. 2019 - Jun. 2020	Data Examination & Environmental Research	NWS & USA
Nov. 2019 - Jun. 2020	Verify and Analyze Sounding Data to Determine Impact on Low Level Stability	NWS & USA
Jan. 2020	Produce Mid-Year COMET Report	NWS & USA
Sep. 2020 - Jan. 2021	Deliver Presentation – National Weather Association or American Meteorological Society.	NWS & USA

Jul. 2019 - Jan. 2020	Preparation for Professional Publication & Presentation	NWS & USA
Jun. 2020	Complete Final Project Report	NWS & USA

5. Personnel

Jonathan L. Howell
Science and Operations Officer
National Weather Service – Mobile, Alabama
B.S. – Earth Sciences (Concentration: Meteorology),
California University of Pennsylvania, 1997
M.S. – Geosciences (Concentration: Meteorology),
Mississippi State University, 2000

Jonathan Howell is the Science and Operations Officer at the National Weather Service (NWS) Forecast Office in Mobile, Alabama, and has held this position since the summer of 2018. He has been with the NWS since 2002, serving as a Meteorologist Intern from 2002 through early 2005, a Journeyman Meteorologist from 2005 through early 2010, and a Senior Meteorologist from 2010 through 2018, at WFO Memphis, Tennessee. Prior to working with the NWS, he worked as an Air Pollution Meteorologist with both the Memphis and Shelby County Health Department (2000-2002) and the Alabama Department of Environmental Management (2000). His interests continue to be focused in severe weather research and operational forecasting.

Jeffrey M. Medlin
Meteorologist in Charge
National Weather Service – Mobile, Alabama

See Attached Vita

Dr. Sytske Kimball
Professor – Department Chair
Department of Earth Sciences
University of South Alabama

See Attached Vita

Dr. John Lanicci
Associate Professor – Meteorology
Department of Earth Sciences
University of South Alabama

See Attached Vita

6. NWS Project Budget Page

	COMET Funds	NWS Contributions (FY)
University Senior Personnel		
1. Dr. Sytske Kimball	$0.00	N/A
2. Dr. John Lanicci	$0.00	N/A
Other University Personnel		
1. USA Student Tuition Assist	$0.00	N/A
2. USA Student Wages	$3,000.00	
Fringe Benefits on University Personnel (0.76% only on salary)	N/A	
Total Salaries + Tuition + Fringe Benefits	$3,000.00	
NWS Personnel		
1. Jonathan L. Howell	N/A	120 hrs
2. Jeffrey M. Medlin	N/A	60 hrs
Travel		
1. Research Travel		$250
2. Conference Travel		$2,000
3. Training Travel		$100
4. Data Collection Travel	$1,395	
Total Travel	$1,395	$2,350
Other Direct Costs		
1. Materials & Supplies	$7,510	N/A
2. Publication Costs	N/A	$3,650
3. Other Data		
4. NWS Computers & Related Hardware	N/A	
5. Other (specify)	N/A	
Total Other Direct Costs	$7,510	$3,650
Indirect Costs		
1. Indirect Cost Rate	26% (off campus research)	
2. Applied to which items?	Salary, Materials, and Travel	
Total Indirect Costs	$3095.00	
Total Costs (Direct + Indirect)	$15,000.00	$6,000

A. Budget Summary

The requested budget amount of $15,000.00 would be used for funding five undergraduate students from November 01, 2019, through February 29, 2020 at a total cost of $3,000. $1,395 is requested to travel to and from the balloon launch sites for the duration of the project. This will primarily be used to pay for gas for Meteorology program vehicles and occasionally to reimburse students for mileage. The budget also includes the purchase of necessary equipment for the project for the Department of Earth Sciences, USA in the amount of $7,510. One or more of the funded undergraduate students will have their research directed by Dr. John Lanicci. It is anticipated that this project will be incorporated into the students' research assignment and that meteorologists from the NWS Mobile office will participate as adjunct research committee members.

7. References

Bessardon, G.E.Q., K. Fosu-Amankwah, A. Petersson, B.J. Brooks, 2018: Evaluation of Windsond S1H2 Performance in Kumasi during the 2016 DACCIWA Field Campaign. Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2018-179, in review, 2018.

Craven, J.P., 2000: A Preliminary Look at Deep Layer Shear and Middle Level Lapse Rates Associated with Major Tornado Outbreaks. *Preprints, 20th Conf. Severe Local Storms*, Orlando, FL.

Evans, J.S., and J.L. Guyer, 2006: The Relationship of Cool Season Significant Tornado Events and Buoy Data in the Western Gulf of Mexico. *Preprints, 23rd Conf. Severe Local Storms*, St. Louis MO.

Gagan, J.P., A. Gerard and J. Gordon, 2010: A Historical and Statistical Comparison of "Tornado Alley" to "Dixie Alley." Natl. Wea. Dig., 34, 145–155.

Galway, J.G., and A. Pearson, 1981: Winter Tornado Outbreaks. *Wea. Forecasting*, 109, 1072-1080.

Guyer, J.L., D.A. Imy, A. Kis, and K. Venable, 2006: Cool Season Significant (F2-F5) Tornadoes in the Gulf Coast States. *Preprints, 23rd Conf. Severe Local Storms*, St. Louis MO.

Kis, A.K., and J. Straka, 2010: Nocturnal Tornado Climatology. *Wea. Forecasting*, 25, 545-561.

Markowski, P.M., Y. P. Richardson, S.J. Richardson, and A. Petersson, 2018: Aboveground Thermodynamic Observations in Convective Storms from Balloonborne Probes Acting as Pseudo-Lagrangian Drifters. Bulletin of the AMS, Vol. 99, No. 4, 711-724.

Medlin, J.M., and M. Bunkers, 2008: An Examination of North Central Gulf Coast Cold Season Pre-Tornadic Vertical Wind Shear Environments since 1996. *33rd National Weather Association Annual Student Meeting*, Louisville, KY.

Medlin, J.M., and P.J. Croft, 1998: A Preliminary Investigation and Diagnosis of Weak Shear Summertime Convective Initiation for Extreme Southwest Alabama. *Wea. Forecasting*, 13, No. 3, Part 2, 717-728.

Potvin, C. K., K. L. Elmore, S. J. Weiss, 2010: Assessing the Impacts of Proximity Sounding Criteria on the Climatology of Significant Tornado Environments. *Wea. Forecasting*, 25, 921-930.

Rasmussen, E.N., and D.O. Blanchard, 1998: A Baseline Climatology of Sounding-Derived Supercell and Tornado Forecast Parameters. *Wea. Forecasting*, 13, 1148-1164.

Rasmussen, E.N., 2003: Refined Supercell and Tornado Forecast Parameters. *Wea. Forecasting*, 18, 530-535.

Thompson, R.L., B.T. Smith, J.S. Grams, A.R. Dean, and C. Broyles, 2012: Convective Modes for Significant Severe Thunderstorms in the Contiguous United States. Part II: Supercell and QLCS Tornado Environments. *Wea. Forecasting*, 27, 1136-1154.

"Windsond: Lightweight and Reusable Radiosonde", Windsonde Embedded AB, V4, February 2017, http://sparvembedded.com/Windsond_flyer_v5.pdf.

Wilzen, Mattias. "Re: Publications involving windsonde." Received by Dr. Sytske Kimball, 11 Feb. 2019.

"Windsonde", Windsonde Embedded AB, 2015, http://www.windsond.com

"Windsonde Technology - Sonde Reuse", Windsonde Embedded AB, 2015, http://www.windsond.com/sonde-reuse/

NWS Checklist for Submitting a COMET Outreach Proposal

Actions Before Proposal is Submitted to COMET	YES	NO	DATE
1. Did NWS office staff and university staff meet to discuss and form outline and scope of project?	X		Nov. 28, 2018
2. Did NWS office consult Scientific Services Division (SSD) staff?	X		Feb. 11, 2019
3. Was Statement of Work and budget formulated as a team effort between university and NWS staffs?	X		
4. Was proposal submitted to SSD for review?	X		Feb. 11, 2019
5. Did SSD forward copies of proposals dealing with WSR-88D data to Radar Operations Center (ROC), Applications Branch Chief for review?		X – N/A	
6. Did SSD forward copies of proposals dealing with hydrometeorology to the Senior Scientist of OHD for review?		X – N/A	
7. Did SSD review the data request for project to ensure its scope and criticality for proposal?	X		Feb. 13, 2019
8. Is all data for the project being ordered by NWS offices through the National Climatic Data Center's (NCDC) Research Customer Service Group free of charge?	X		
9. Does budget include publication charges and travel costs for NWS employees to present results at scientific conferences?	X		
10.Does budget separate NWS costs into fiscal year costs and university costs into calendar year costs?	X		
11.Does proposal include a separate justification for university hardware purchases which are usually not funded by the COMET Outreach Program?		X – N/A	
12. Have the following people signed off on the proposal cover sheet: - MIC/HIC? - SSD Chief? - Regional Director?	X		Mar. 29, 2019
13. Is a letter of endorsement signed by regional director attached?	X		Mar. 29, 2019

NWS Checklist for Submitting a COMET Outreach Proposal

Actions after Endorsement by NWS	YES	NO	DATE
1. University submits proposal to the COMET Program.			
2. Proposal acknowledgment letter sent by the COMET Program to submitting university with copies to SSDs and NWS office.			
3. COMET review of proposal (internal review for Partners Project proposals and formal review for Cooperative Project proposals).			
4. The COMET Program sends acceptance, rejection, or modification letters to university with copies to SSD, NWS office, and OST12.			
5. The COMET Program allocates funds for university.			
6. OST12 obligates funds for NWS offices.			
7. SSD/NWS office orders data from NCDC.			
8. NWS office or SSD calls OST12 for accounting code for expenses.			
9. NWS office sends copies of all travel vouchers and expense records to OST12.			
10. NWS office or SSD sends copies of publication page charge forms to OST12.			
11. NWS office keeps SSD informed of progress on the project and any results or benefits derived from the project.			

Biographical Sketch Sytske K. Kimball

a. Professional Preparation

Delft University of Technology,	Delft, The Netherlands	Applied Mathematics Bachelor of Science, 1988
Monash University,	Melbourne, Australia	Meteorology Master of Science, 1993
The Pennsylvania State University,	University Park, PA 16802	Meteorology Ph.D., 2000

b. Appointments

The University of South Alabama: Chair, Department of Earth Sciences, August 2014 - present
The University of South Alabama: Professor in Meteorology, August 2010 - present
The University of South Alabama: Associate Professor in Meteorology, August 2006 - 2010
The University of South Alabama: Assistant Professor in Meteorology, August 1999 - 2006
The Pennsylvania State University: Research and Teaching Assistantships, August 1993 - July 1999
The CSIRO Division of Atmospheric Research, Melbourne, Australia: Research Assistant, February 1990 - July 1993
Dutch Telecom Dr. Neher Research Laboratory, The Netherlands: Researcher, March 1989 - December 1989
TNO Research Facility, The Netherlands/Human Reliability Associates, U.K. Internships, January 1987 - December 1987

c. Products

Products most closely related to the proposed project

Kimball, Sytske K., M.S. Mulekar, S. Cummings, and J. Stamates, 2010: The University of South Alabama Mesonet and coastal observing system: A technical and statistical overview. *J. Atmos. Oceanic Tech.*, **27**, 1417 - 1439.

Jeffrey M. Medlin, **Sytske K. Kimball**, and Keith G. Blackwell, 2007: Radar and rain gauge analysis of the extreme rainfall during Hurricane Danny's (1997) landfall. *Monthly Weather Review*, **135**, 1869 - 1888

Madhuri S. Mulekar and **Sytske K. Kimball**, 2004: The statistics of Hurricanes. *STATS, The magazine for students of statistics,* **39**, 3 – 9

Kimball, Sytske K. and Madhuri S. Mulekar, 2004: A 15-year climatology of North Atlantic Tropical cyclones, Part I : Size Parameters. *Journal of Climate*, **17**, 3555 - 3575

Other Significant Products

Kimball, Sytske K., 2013: Book review: The weather observer's handbook. Stephen Burt 2012, 456 pp., $99.00, hardbound, Cambridge University Press, ISBN 978-1-107-02681-0. *Bulletin of the American Meteorological Society*, **94**, 733 – 735

Kelin Hu, Qin Chen, and **Sytske K. Kimball**, 2011: Consistency in hurricane surface wind forecasting: An improved parametric model. *Natural Hazards*, **61**, 1029 – 1050

Kimball, Sytske K, 2008: Structure and evolution of rainfall in numerically simulated landfalling hurricanes. *Monthly Weather Review*, **136**, 3822 – 3847

Kimball, Sytske K. and F. Carroll Dougherty, 2006: The Sensitivity of Idealized Hurricane Structure and Development to the Distribution of Vertical Levels in MM5. *Monthly Weather Review*, **134**, 1987-2008

Kimball, Sytske K., 2006: A modeling study of hurricane landfall in a dry environment. *Monthly Weather Review*, **134**, 1901-1918

Kimball, S. K. and J. L. Evans, 2002: Idealized numerical simulations of hurricane-trough interaction. *Mon. Wea. Rev*., **130**, 2210-2227

d. Synergistic Activities

I am the director of the South Alabama Mesonet, a network of 25 weather stations in the northern Gulf Coast area. Mesonet stations were installed beginning in 2005 under my supervision, using NSF CAREER and NOAA funding. Weather station data (available at http://chiliweb.southalabama.edu/) are used by local forecasters, in K-12 and college teaching, in university research, and for various purposes in the community.
The South Alabama Mesonet belongs to the National Mesonet.
I serve on the Advisory Board for the National Mesonet program.
I serve on the Science Council for the Alabama Mesonet.
I participate in science training events for K-12 school teachers.
I supervise undergraduate meteorology majors participating in research. Several of these students have attended and presented at professional conferences, many went on to graduate school.
I was a member of the American Meteorological Society (AMS) Measurement Committee from 2012 – 2015 and currently serve on the AMS Nationwide Networks of Networks Committee.
I was on the (NSF funded) Gulf Coast ADVANCE leadership team, representing the University of South Alabama from 2013 - 2016. We coordinated various activities to support and promote women faculty in STEM disciplines.

Jeffrey Mark Medlin
NOAA National Weather Service Forecast Office
8400 Airport Blvd., Bldg#11
Mobile, AL 36608
251.633.6443 **ext. 222**
jeff.medlin@noaa.gov

Education

- *B.S.* Meteorology, North Carolina State University (1988)
- *M.S.* Atmospheric Science - University of Alabama in Huntsville (2002). Thesis Title - *A Single-Doppler Analysis of the Outer Rainband Mesocyclones Associated with Hurricane Opal of 4 October 1995."* Thesis Advisor: Dr. Kevin Knupp.

Career

- NWS Meteorologist in Charge, Mobile, AL (2014 - Present)
- NWS Science and Operations Officer, Mobile, AL (1994-2014)
- NWS Meteorologist Instructor (OSF - Operations Training Branch, 1992-94)
  - Convective Systems, Structure and Evolution
  - WSR-88D Base Products
  - Hydrometeorological Optimization of the WSR-88D UCP

- NWS Meteorologist (General Forecaster), Charleston, WV (1991-92)
- NWS Meteorologist Intern, Cincinnati, OH (1989-91)
- NWS Student Trainee Meteorologist, WSFO Columbia, SC (1987-88)
- Undergraduate Research Assistant (Polar Lows, Dr. Steven Businger and G.A.L.E. Ken Carey, 1987-88).

Research Interests

Any evolving mesoscale, sub-synoptic scale phenomena and/or processes, NWP (especially local modeling), radar, satellite and mesoscale analyses. Most recently have become very interested in global scale circulations and their potential effects on prolonged synoptic patterns. Numerous refereed publications.

Other

Since 1994, I have mentored countless undergraduate meteorology students regarding personal career and education decisions. Many of these students keep in touch and thank me for career advice I have given. Some of these students have moved on to higher positions within the NWS. More recently, and due to my position, I have reached out to assist colleagues with career advice. I take pride in the professional development and growth of others.

Major Career-Related Activities

- NWS Southern Regional Collaborative Council (Lead, Sep 2017 – present)
- NWS SOO Development Course Co-Lead Instructor (August 2017)
- COMET NWP Module Team (2015)
- NOAA-NWS Hurricane Sandy (2012) Service Assessment Team (2012-13)
- NASA SPoRT Mesoscale Modeling Initiatives (2011-13, numerous activities)
- NOAA Hollings (served as mentor for three students, 2011-2013)
- NWA E-Journal Editor (2007-2010) – Three-year appointment.
- NWS SR BLAST Graduate (2008)
- NWS IFPS Science Steering Team (ISST, 2004-2006)
- Regional Mesonet Development (served on several teams to expand observational data platforms with MS Mesonet, USA Mesonet and NW FL Mesonet).
- NWS Southern Region Forecast Development Program Team (FDP), 2004-5)
- University of South Alabama Adjunct Meteorology Instructor (Dynamics I, 2003)
- NWS SOO Job-Aid Co-Developer (2002)
- COMET Partner's Project (1996) - Convective Initiation Co-Principal Investigator

Career Peer-Reviewed Publications

- 14 Peer Reviewed Publications (1990-2012) – References Provided Upon Request

Conference Presentations

- 33 Regional and National Conference Presentations (1996-2012) – References Provided Upon Request

Biographical Sketch **John M. Lanicci**

a. Professional Preparation

Manhattan College,	Bronx, NY 10471	Physics Bachelor of Science (summa cum laude), 1979
The Pennsylvania State University,	University Park, PA 16802	Meteorology Bachelor of Science (highest distinction), 1980
The Pennsylvania State University,	University Park, PA 16802	Meteorology Master of Science, 1984
The Pennsylvania State University,	University Park, PA 16802	Meteorology Doctor of Philosophy, 1991

b. Appointments*

The University of South Alabama: Associate Professor of Meteorology, August 2017 - present

Embry-Riddle Aeronautical University: Professor of Applied Meteorology/Meteorology, August 2011 - December 2016

Embry-Riddle Aeronautical University: Associate Professor of Applied Meteorology, August 2006 - 2011

Embry-Riddle Aeronautical University: Coordinator, M.S. in Aeronautics Program, January 2012 - December 2015

Air Force Weather Agency, Offutt AFB, NE: Commander, June 2004 - 2006

HQ USAF Directorate of Weather, Washington, DC: Chief, Weather Plans Division, July 2003 - May 2004

Air War College, Maxwell AFB AL: Professor, Dept. of Warfighting, June 2000 - July 2003

88th Weather Squadron, Wright-Patterson AFB OH: Commander, September 1997 - June 2000

HQ USAF Directorate of Command & Control, Washington, DC: Chief, Modeling, Simulation, and Analysis Data Management and Environmental Branch, March 1995 - September 1997

HQ Air Force Global Weather Central, Offutt AFB, NE: Assistant Chief/Chief, Meteorological Models, June 1991 - March 1995

Air Force Institute of Technology Doctoral Program, Penn State University, University Park PA: Doctoral Student, April 1988 - June 1991

Detachment 3, 11th Weather Squadron, Shemya AFB AK: Commander, March 1987 - April 1988

Air Force Geophysics Laboratory, Hanscom AFB, MA: Atmospheric Diffusion Project Manager/ Research Meteorologist, January 1984 - February 1987

Air Force Institute of Technology M.S. Program, Penn State University, University Park PA: Master's Student, March 1982 - December 1983

HQ Air Force Global Weather Central, Offutt AFB NE: Wing Weather Officer, June 1980 - February 1982

Air Force Institute of Technology Basic Meteorology Program, Penn State University, University Park PA: Student, June 1979 - May 1980

* From 1979 to 2006, I was a U.S. Air Force meteorologist; appointments are typically 2-3 years.

c. Products

Products most closely related to the proposed project

Lanicci, J.M., and A.D. Schnapp, 2018: Extreme value statistical analysis of rainfall over Kennedy Space Center and Cape Canaveral Air Force Station using a high-resolution rain gauge network. Submitted to *Journal of Applied Meteorology and Climatology*.

Lanicci, J. M., 2016: A multi-scale analysis of the atmospheric conditions associated with the Daytona Beach tornado of Christmas Day, 2006. *Electronic Journal of Severe Storms Meteorology*, Vol. 11, No. 5, 1-44.

Lanicci, J. M., 2016: The tornado that struck Embry–Riddle Aeronautical University on Christmas Day, 2006: Lessons learned from a near-miss. *Journal of Aviation/Aerospace Education and Research*, Vol. 25, Number 2 (Spring).

Lanicci, J.M., and T.T. Warner, 1997: A case study of lid evolution using analyses of observational data and a numerical model simulation. *Weather and Forecasting*, 12, 228–252.

Lanicci, J.M., and T.T. Warner, 1991: A synoptic climatology of the elevated mixed-layer inversion over the southern Great Plains in spring. Part I: Structure, dynamics, and seasonal evolution. *Weather and Forecasting*, 6, 181–197.

Lanicci, J.M., and T.T. Warner, 1991: A synoptic climatology of the elevated mixed-layer inversion over the southern Great Plains in spring. Part II: The life cycle of the lid. *Weather and Forecasting*, 6, 198–213.

Lanicci, J.M., and T.T. Warner, 1991: A synoptic climatology of the elevated mixed-layer inversion over the southern Great Plains in spring. Part III: Relationship to severe–storms climatology. *Weather and Forecasting*, 6, 214–226.

Other Significant Products

Lanicci, J.M., E.H. Murray, and J.D. Ramsay, 2019: *Environmental Security: Concepts, Challenges, and Case Studies*. American Meteorological Society Books, Boston, MA. In revision.

Lanicci, J.M., and J.D. Ramsay, 2014: The Impact of Hurricane Katrina on the Environmental Security of the US Gulf Coast Region and Beyond. Book chapter in *Critical Issues in Homeland Security: A Case Book*, J.D. Ramsay, and L. Kiltz, Eds. Westview Press, Boulder, CO, 150-172.

d. Synergistic Activities

I am an Invited Member of the National Academies Intelligence Science and Technology Experts Group (ISTEG), routinely consulted by the U.S. National Intelligence Community on topics of national importance regarding the future of science and technology.

I am an Invited Member of the National Academies Panel on Information Science at the Army Research Laboratory. I have been involved in multiple technical evaluations of ARL’s research programs in the atmospheric sciences.

I currently supervise three sophomore meteorology majors performing extreme rainfall research.

I was an Invited Member of the National Transportation Safety Board’s General Aviation Weather Safety Panel, held on 19 - 20 June 2012 in Washington, DC.

I was an Invited Member of Working Group #5 of George Mason University’s Center for Climate Change Communication during 2011-2012, to assess climate change content in U.S. undergraduate meteorology programs.

I was the USAF representative on the *Cooperative Program for Operational Meteorology, Education, and Training (COMET) Executive Board* from 2004 to 2006.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service Southern Region Headquarters
819 Taylor Street, Room 10E09
Fort Worth TX 76102

March 29, 2019

MEMORANDUM FOR: Ms. Lorrie Alberta
COMET Outreach Program Administrator
3085 Center Green Drive
Boulder CO 80301

FROM: Steven Cooper, Director Steven Cooper
NWS Southern Region Headquarters

SUBJECT: Letter of Support for COMET Partners Proposal

National Weather Service, Southern Region Headquarters, fully supports the COMET Partners Proposal titled "Defining the Role of the Marine Boundary Layer in Cold Season Tornadogenesis along the north central Gulf Coast."

If this proposal is funded, forecasters at the NWS Weather Forecast Office in Mobile will collaborate with researchers at the University of South Alabama to investigate the marine boundary layer and its impact on local cold season tornadogenesis.

The activities listed in the proposal address a critical observational challenge that occurs regularly in the north central Gulf Coast region: the thermodynamic characteristics of the marine boundary layer is not well-sampled by current upper air networks. Thermodynamic instability, especially in the lowest 3-km of the atmosphere, is an important factor in cool season Gulf Coast tornadoes. Research associated with this Partners Project will lead to better understanding of the marine boundary layer during severe thunderstorm and tornado episodes in this part of the country.

Other activities that are planned for this collaborative research effort include an investigation of how sea surface temperature anomalies upstream from the coast may have affected air mass modification and resulting instability during past tornado episodes. An additional study that identifies air mass characteristics and residence times during return flow events will also increase understanding of how the marine boundary layer evolves in the days prior to potentially tornadic events.

We support the commitment of Dr Lanicci and his team to work with the NWS Mobile office to improve understanding and forecasting of high-impact, life threatening weather events across the Gulf Coast region. Thank you for considering this proposal.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Program Support Center
Financial Management Portfolio
Cost Allocation Services

7700 Wisconsin Avenue, Suite 2301
Bethesda, MD 20814
PHONE: (301) 492-4855
FAX: (301) 492-5081
EMAIL: CAS-Bethesda@psc.hhs.gov

December 14, 2017

G. Scott Weldon
Vice President for Finance & Administration
University of South Alabama
307 University Blvd N Ste 170
Mobile, AL 36688-0002

Dear G. Scott Weldon:

A copy of the facilities and administrative cost (F&A) sent to you for your signature. This Agreement reflects an understanding reached between your organization and a member of my staff concerning the rate(s) that may be used to support your claim for indirect costs on grants and contracts with the Federal Government.

Please have the Agreement signed by an authorized representative of your organization and return within ten business days of receipt. The signed Agreement should be sent to me by email (CAS-Bethesda@psc.hhs.gov, while retaining the copy for your files. Only when the signed Agreement is returned, will we then reproduce and distribute the Agreement to the appropriate awarding organizations of the Federal Government for their use.

An F&A cost proposal, together with supporting information, are required to substantiate your claim for F&A costs under grants and contracts awarded by the Federal Government. Thus, your next proposal based on actual costs for the fiscal year ending 9/30/2020 is due in our office by 3/31/2021. Please submit your next proposal electronically via email to CAS-Bethesda@psc.hhs.gov.

Sincerely,

Darryl W. Mayes -S

Digitally signed by Darryl W Mayes -S
DN: c=US, o=U.S. Government, ou=HHS, ou=PSC, ou=People, 0.9.2342.19200300.100.1.1=20001 31669, cn=Darryl W Mayes -S
Date: 2018.01.04 09:58:09 -05'00'

Darryl W. Mayes
Deputy Director
Cost Allocation Services

Enclosures

COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN: 1630477348A1

DATE:12/14/2017

ORGANIZATION:
University of South Alabama
Office of the Vice President for Finance and Admin
Suite 170
307 University Blvd N
Mobile, AL 36688-0002

FILING REF.: The preceding agreement was dated 06/26/2013

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

SECTION I: Facilities And Administrative Cost Rates

RATE TYPES: FIXED FINAL PROV. (PROVISIONAL) PRED. (PREDETERMINED)

EFFECTIVE PERIOD

TYPE	FROM	TO	RATE(%)	LOCATION	APPLICABLE TO
PRED.	10/01/2017	09/30/2018	53.00	On-Campus	Organized Research-Medicine
PRED.	10/01/2018	09/30/2021	54.00	On-Campus	Organized Research-Medicine
PRED.	10/01/2017	09/30/2021	41.00	On-Campus	Organized Research-Others
PRED.	10/01/2017	09/30/2021	52.00	On-Campus	Instruction
PRED.	10/01/2017	09/30/2021	37.00	On-Campus	Other Sponsored Activities
PRED.	10/01/2017	09/30/2021	26.00	Off-Campus	All Programs

ORGANIZATION: University of South Alabama
AGREEMENT DATE: 12/14/2017

TYPE	FROM	TO	RATE(%)	LOCATION	APPLICABLE TO
PROV.	10/01/2021	Until Amended			Use same rates and conditions as those cited for fiscal year ending September 30, 2021.

*BASE

Modified total direct costs, consisting of all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel and up to the first $25,000 of each subaward (regardless of the period of performance of the subawards under the award). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, rental costs, tuition remission, scholarships and fellowships, participant support costs and the portion of each subaward in excess of $25,000. Other items may only be excluded when necessary to avoid a serious inequity in the distribution of indirect costs, and with the approval of the cognizant agency for indirect costs.

SECTION II: SPECIAL REMARKS

TREATMENT OF FRINGE BENEFITS:

The fringe benefits are specifically identified to each employee and are charged individually as direct costs. The directly claimed fringe benefits are listed below.

TREATMENT OF PAID ABSENCES

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims are not made for the cost of these paid absences.

OFF-CAMPUS DEFINITION: For all activities performed in facilities not owned by the institution and to which rent is directly allocated to the project(s) the off-campus rate will apply. Grants or contracts will not be subject to more than one F&A cost rate. If more than 50% of a project is performed off-campus, the off-campus rate will apply to the entire project.

Fringe Benefits include: FICA, Retirement, Life Insurance, Hospital Insurance, Long-Term Disability, TIAA/CREF and Health Insurance.

Equipment means an article of nonexpendable tangible personal property having a useful life of more than one year, and an acquisition cost of $5,000 or more per unit.

The next indirect cost proposal based on actual costs for the fiscal year ending 09/30/2020, is due by 03/31/2021.

ORGANIZATION: University of South Alabama

AGREEMENT DATE: 12/14/2017

SECTION III: GENERAL

A. LIMITATIONS:

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted: such costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that have been treated as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

B. ACCOUNTING CHANGES:

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency. Such changes include, but are not limited to, changes in the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result in cost disallowances.

C. FIXED RATES:

If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

D. USE BY OTHER FEDERAL AGENCIES:

The rates in this Agreement were approved in accordance with the authority in Title 2 of the Code of Federal Regulations, Part 200 (2 CFR 200), and should be applied to grants, contracts and other agreements covered by 2 CFR 200, subject to any limitations in A above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

E. OTHER:

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to these programs.

BY THE INSTITUTION:		ON BEHALF OF THE FEDERAL GOVERNMENT:
University of South Alabama		DEPARTMENT OF HEALTH AND HUMAN SERVICES
(INSTITUTION)		(AGENCY)
[signature]		Darryl W. Mayes -S Digitally signed by Darryl W. Mayes -S DN: c=US, o=U.S. Government, ou=HHS, ou=PSC, ou=People, 0.9.2342.19200300.100.1.1=2000131669, cn=Darryl W. Mayes -S Date: 2018.01.04 09:57:19 -05'00'
(SIGNATURE)		(SIGNATURE)
G Scott Weldon	for	Arif Karim
(NAME)		(NAME)
Vice President, Finance & Admin		Director, Cost Allocation Services
(TITLE)		(TITLE)
1/18/18		12/14/2017
(DATE)		(DATE) 7144
		HHS REPRESENTATIVE: Denise Shirlee
		Telephone: (214) 767-3261

COMPONENTS OF THE PUBLISHED FACILITIES & ADMINISTRATIVE COST RATE

INSTITUTION: UNIVERSITY OF SOUTH ALABAMA

FY COVERED BY RATE: FY 2018 - FY 2021

RATE TYPE:	ORGANIZED RESEARCH			ORGANIZED RESEARCH - OTHER		INSTRUCTION		OTHER SPONSORED ACTIVITIES	
	On-Camp FY 18	On-Camp FY 19 - 21	Off-Camp FY 18 - 21	On-Camp FY 18 - 21	Off-Camp FY 18 - 21	On-Camp FY 18 - 21	Off-Camp FY 18 - 21	On-Camp FY 18 - 21	Off-Camp FY 18 - 21
RATE COMPONENTS:									
Building Depreciation	4.1	4.3		2.2		2.5		1.5	
Equipment Depreciation	2.5	2.7		1.2		0.7		0.2	
Interest	4.0	4.2		0.2		2.3		0.6	
Operations & Maintenance	13.9	14.3		10.6		10.5		6.7	
Library	2.5	2.5		0.8		10.0		2.0	
Administrative Component	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
F&A Rate	53.0	54.0	26.0	41.0	26.0	52.0	26.0	37.0	26.0

CONCURRENCE:

UNIVERSITY OF SOUTH ALABAMA
(Institution)

[signature]
(Signature)

G Scott Weldon
(Name)

Vice President, Finance & Admin
(Title)

1/18/18
(Date)